10/728,247 mfo

Attorney Docket No. 5034-0001
Customer Number 28777

pg 44, 2-10

[~~0167~~] The function ~~$E_B(t)-Q(E_{B\,estT}(t))$~~ $E_B(t)-Q(E_{B\,est1}(t))$ is zero most of the time, and has a pulse whenever a bit error occurs based on ~~$E_{B\,estT}$~~ $E_{B\,est1}$. The noise term in equations 28 and 26a cannot be avoided, and in fact it is the target to make the system noise limited. Comparing equation 28 with 26a, ~~$E_{A\,est2}$~~ $E_{A\,est2}$ is closer than ~~$E_{A\,estT}$~~ $E_{A\,est1}$ to ~~$E_A(t)\otimes f(t)$~~ $E_A(t)\otimes f(t)$ provided that ~~$E_B-Q(E_{B\,estT})$~~ $E_B-Q(E_{B\,est1})$ has a lower root mean square (r.m.s.) deviation than ~~$E_{B\,estT}$~~ $E_{B\,est1}$. This is correct when the BER of ~~$E_{B\,estT}$~~ $E_{B\,est1}$ is lower than about 0.5. The channels should be spaced less than approximately the symbol rate before this condition is violated, so linear crosstalk subtraction enables a very low channel spacing to be achieved.

pg 45, lines 3-7

Please replace ~~paragraph [0171]~~ with the following amended paragraph:

[0171] The discussion above utilizes complex numbers to describe sine and cosine functions because this notation is a compact way of including the phase of the sine wave or cosine wave. For example the electric field is written in the form:

~~$E(t)=\mathrm{Re}\left[E_s e^{i\omega t}\right]$ (A1)~~

$$E(t)=\mathrm{Re}\left[E_s e^{i\omega t}\right] \qquad \text{(A1)}$$

pg 45, lines 8-10

Please replace ~~paragraph [0172]~~ with the following amended paragraph:

[0172] where ~~E_s~~ E_s is a complex number. This can be expressed in terms of sines and cosines as:

~~$E(t)=\mathrm{Re}[E_s]\cos(\omega t)-\mathrm{Im}[E_s]\sin(\omega t)$~~

$$E(t)=\mathrm{Re}[E_s]\cos(\omega t)-\mathrm{Im}[E_s]\sin(\omega t)$$

pg ~~46~~ 45, lines 11-12

Please replace ~~paragraph [0173]~~ with the following amended paragraph: mfo 10/01/08

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45 ~~pg 46~~ mfw 10/01/08

~~[0173]~~ Or if complex ~~E_s~~ E_s is written in terms of its magnitude and phase as:

$$\cancel{E_s = |E_s| e^{i\theta_s}}$$

$$E_s = |E_s| e^{i\theta_s}$$

Please replace ~~paragraph [0174]~~ pg ~~46~~ 45, lines 13-14 with the following amended paragraph: mfw 10/01/08

~~[0174]~~ then A1 becomes:

$$\cancel{E(t) = |E_s| \cos(\omega t + \theta_s)}$$

$$E(t) = |E_s| \cos(\omega t + \theta_s)$$

Please replace ~~paragraph [0175]~~ pg ~~46~~ 45, lines 15-18 with the following amended paragraph: mfw 10/01/08

[0175] The complex number notation is compact because the phase of the sine wave is stored in the phase of the complex number.

In some places in the discussion, there appear equations like:

$$\cancel{\text{beat term} = \mathrm{Re}\left[E_s E_{LO}^* e^{i\omega t}\right]} \qquad \cancel{(A2)}$$

$$\text{beat term} = \mathrm{Re}\left[E_s E_{LO}^* e^{i\omega t}\right] \qquad (A2)$$

Please replace ~~paragraph [0176]~~ pg ~~46~~ 45, lines 19-21 with the following amended paragraph: mfw 10/01/08

[0176] ~~E_{LO}^*~~ E_{LO}^* is the complex conjugate of ~~E_{LO}~~ E_{LO}, meaning that every occurrence ~~of i~~ of i is replaced with ~~$-i$~~ $-i$, and:

$$\cancel{E_{LO}^* = |E_{LO}| e^{-i\theta_{LO}}}$$

$$E_{LO}^* = |E_{LO}| e^{-i\theta_{LO}}$$

Please replace ~~paragraph [0177]~~ pg ~~46~~ 45 lines 22-23 with the following amended paragraph: mfw 10/01/08

[0177] So A2 can be rewritten as:

$$\cancel{\text{beat term} = |E_s||E_{LO}| \cos(\omega t + \theta_s - \theta_{LO})}$$

$$\text{beat term} = |E_s||E_{LO}| \cos(\omega t + \theta_s - \theta_{LO})$$

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pg ~~46~~ 45, lines 24-25

Please replace ~~paragraph [0178]~~ with the following amended paragraph: mpo 10/01/08

[0178] The appearance of ~~$E_s E_{LO}^*$~~ $\underline{E_s E_{LO}^*}$ in A2 means to take the phase difference between ~~E_s~~ $\underline{E_s}$ and ~~E_{LO}~~ $\underline{E_{LO}}$.

pg 46, lines 1-4

Please replace ~~paragraph [0179]~~ with the following amended paragraph:

[0179] The power of an optical wave is given by the magnitude squared of the complex electric field, and does not have a sinusoid time dependence. In the case of a field given by A1:

$$\cancel{power = \left(E_s e^{i\omega t}\right)^* \left(E_s e^{i\omega t}\right) = |E_s|^2}$$

$$\underline{\text{power} = \left(E_s e^{i\omega t}\right)^* \left(E_s e^{i\omega t}\right) = |E_s|^2}$$

pg 46, line 17-18

Please replace ~~paragraph [0183]~~ with the following amended paragraph:

[0183] A Jones unit vector ~~$\hat{\mathbf{p}}$~~ $\underline{\hat{\mathbf{p}}}$ has the property that is:

$$\cancel{\hat{\mathrm{p}}.\hat{\mathrm{p}}^* = 1}$$

$$\underline{\hat{\mathrm{p}}.\hat{\mathrm{p}}^* = 1}$$

pg 46, lines 19-20

Please replace ~~paragraph [0184]~~ with the following amended paragraph:

[0184] If light polarized in SOP ~~$\hat{\mathbf{p}}_1$~~ $\underline{\hat{\mathrm{p}}_1}$ passes through a polarizer oriented in direction ~~$\hat{\mathbf{p}}_2$~~ $\underline{\hat{\mathrm{p}}_2}$, then the electric field is scaled by ~~$\hat{\mathbf{p}}_1 \cdot \hat{\mathbf{p}}_2^*$~~ $\underline{\hat{\mathrm{p}}_1 . \hat{\mathrm{p}}_2^*}$. In general ~~$0 \leq \left|\hat{\mathbf{p}}_1 \cdot \hat{\mathbf{p}}_2^*\right| \leq 1$~~ $\underline{0 \leq \left|\hat{\mathrm{p}}_1 . \hat{\mathrm{p}}_2^*\right| \leq 1}$.

pg 47, lines 1-3

Please replace ~~paragraph [0185]~~ with the following amended paragraph: